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ABSTRACT

The purpose of this pilot study was to determine the contributions of computerized health risk appraisal when used as a supplement to the traditional methods of health instruction. Subjects were a convenience sample of 26 students enrolled in a university level, personal health course. Using a one group pretest posttest design, these subjects were evaluated in terms of knowledge of causes of death specific to the individual, knowledge of risk factors, behavioral intentions, and health beliefs (changeability) before and after a health risk appraisal. The computer appraisal program used included the Health Risk Appraisal program (Raines and Ellis, 1982) and the Computerized Health Appraisal program (Hall, 1983). Results showed significant improvements on measures of student knowledge of causes of death and risk factors, but no beneficial effects on behavioral intentions and changeability. Although the diagnostic and therapeutic benefits of health risk appraisal remain uncertain, findings indicate that the computerized health risk appraisal was a useful health promotion tool when used in a personal health class. A copy of the test instrument is included and 26 references are listed. (LMM)

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The Use of Microcomputers in Health Risk Appraisal

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The Use of Microcomputers in Health Risk Appraisal

Introduction

The premature onset of disease and chronic deterioration of health resulting in unnecessary disability and death has largely been attributed to the effects of current negative health practices such as cigarette smoking, alcohol abuse, physical inactivity, poor nutrition, and stress (Kuller, 1980; Farquahar, 1977; Maccoby, 1977; Salone, 1979). Among the major determinants of health status listed under the health field concept (LaLonde, 1974; Leframboise, 1973) which include biology, environment, health care, and lifestyle; the latter has increasingly become the focus of public health programs. Leaders in the health care field contend that future advances in the health status of the population will not result from improvements in medical technology or environmental engineering, but rather by the adoption of healthy lifestyles by the public (Dubos, 1959; Fuchs, 1974).

In support of this approach, two seminal documents, Healthy People, (U.S. Department of Health, Education, and Welfare [DHEW], 1979) and Objectives for the Nation, (U.S.. Department of Health and Human Services, 1980) have established future health priorities. These public health program priorities focus on the modification of behavioral risk factors contributing to premature morbidity, mortality, and disability. Numerous primary, secondary, and tertiary prevention programs have been implemented to favorably affect health practices. However, the paucity of data on effective prevention programs warrants further investigation of the antecedents of negative health behaviors, high risk populations, appropriate educational interventions, and technically sound evaluation

procedures.

Green, Kreuter, Deeds, and Partridge (1979) define health education as the process of "...facilitating voluntary adaptations of behavior conducive to health" (p.7). The primary goals of health education programs include any one or a combination of the following: (1) increase positive health behavior, (2) decrease negative health behavior, (3) prevent an increase in negative health behavior, and (4) prevent a decrease in positive health behavior (Green, et al. 1979). The multiplicity of factors which influence the onset and continuation of health damaging behaviors requires the use of a cadre of theoretically and methodologically sound educational strategies.

Not unlike many professions and academic disciplines, health education is being affected by emerging technologies (McGinnis, 1983). Computer technology with the capability of mass producing and disseminating information presents exciting opportunities for health education programs designed to enhance the well being of the population. The focus of this paper is on a technological innovation in public health practice - the use of computerized health risk assessments as an aid to instruction.

Background

Health risk assessment is defined as a "...health promotion technique in which an individual's health related behaviors and characteristics are compared to mortality statistics and epidemiological data for similar individuals in order to estimate his or her risk of dying by some specified future time." (Baseline, 1984, p.1) The original health hazard appraisal (Robbins and Hall, 1970) and many of the appraisal instruments which have since been developed are based on the Geller/Gesner mortality and risk factor statistical tables. The health

assessment informs the individual of modifiable risk factors which would minimize premature morbidity, mortality, and disability and enhance quality of life.

Health risk assessment may be used in the planning, implementation, and evaluation of health education programs. Most frequently this innovation in public health practice has been used by professionals and consumers as a tool to identify health damaging lifestyles and behavioral risk factors. Because of limitations in estimating risk (Baseline, 1984; Fielding, 1981; Schoenbach, Wagner, Karon, 1983; and Wagner, Beery, Schoenbach, and Graham, 1982;) the computerized health risk appraisal may be used most appropriately as a program recruitment strategy, motivational device, or method of structuring an educational intervention (Gold and Duncan, 1980). Health risk assessments have the ability to: (1) provide information about health risk factors, (2) focus attention on the relationship between health behavior and the probability of disease, (3) lower costs and enhance instructional efficiency, (4) increase public support for, and credibility of health education efforts which rely on sound epidemiological data, and (5) link lifestyle with disease in a way that is consistent with public health practice (Baseline, 1984).

Health risk assessment generally requires information regarding an individuals demographic characteristics, behaviors, and behavioral risk factors. The computerized assessment provides feedback in the following areas: (1) appraised age, (2) compliance age, (3) cause of death, (4) risk factors, and (5) behavioral recommendations (Dunton, 1981). These elements of the appraisal are defined in Figure 1. The assessment may require the individual to complete a short, simple self-administered questionnaire, or a complex computer assisted questionnaire relying on epidemiological data, mortality statistics, and actuarial tables.

Resource listing have been compiled which identify and describe more than 26 available health risk appraisal programs (Beery, Wagner, Schoenback, and Graham, 1981).

Insert Figure 1 about here

Health risk assessment is not an independent entity. That is, health risk assessment is a vital component of a comprehensive health education program which includes, orientation, assessment, interpretation, goal setting, and intervention or referral. Failure to complete each component of this process may jeopardize successful behavior change efforts.

The theoretical basis for the health risk assessment process is the Health Belief Model (Rosenstock, 1974). The model indicates that the likelihood of an individual taking preventive health actions is based on individual perceptions of susceptibility, severity, and the cost/benefit ratio. Results of the computerized assessment have the potential to increase the individuals motivation to act by influencing beliefs of susceptibility, severity, and perceived benefits of acting on recommendations.

The positive effects of computerized health risk assessments on knowledge, beliefs, attitudes, or behaviors have not been demonstrated. Randomized controlled studies have not found beneficial effects of computer appraisals on health attitudes (Cioffi, 1979), and health behaviors (Hancock, Lees, Binhammer, et al., 1978). In a review of the effectiveness of computer based programs for health education, Chen and

DEFINITIONS

Figure 1

APPRAISED AGE : This is how old your body is based upon how well you have been treating it.

COMPLIANCE AGE : This is how young your body can become if you reduce your health risks as recommended.

PATIENT RISK : This compares the amount of risk you have relative to others of your same age, race, and sex.

CAUSE OF DEATH : These diseases or conditions are major killers of persons your age and sex.

RISK FACTORS : These health habits contribute to the possibility of illness, disability, or death in the next ten years.

RECOMMENDATIONS : You can eliminate these risk by actions which only you can take.

Cornett (1983) indicate that knowledge changes and increased motivation can be expected to occur, but evidence of behavior change as a function of health risk assessment has not been documented.

A review of the research on the effectiveness of computer assisted instruction (Edwards, Norton, Taylor, Weiss, and Dusseldorp, 1975) indicates that the computer is an effective supplement to traditional methods of instruction. Certain aspects of learning appear to be enhanced by computer assisted instruction. Therefore, the effectiveness of health risk assessment when used in computer assisted instruction warrents further research.

Problem

The problem of this pilot study was to assess the contributions of the computerized health risk appraisal when used as a supplement to the traditional instructional methods employed in a university level personal health course. Specifically, the pilot study was implemented to determine the effects of the health risk appraisal on selected student outcome measures including: (1) knowledge of the individual's causes of death according to age, sex, and race, (2) knowledge of the major contributing risk factors associated with each cause of death, (3) perceived willingness to make recommended changes in health habits and behaviors, and (4) perceived difficulty in making positive lifestyle changes.

Methods

A convenience sample of 26 university students enrolled in a personal health course were selected to participate in the pilot study. As a course requirement, students were instructed to complete a personal health risk appraisal during the fall semester of the 1984 academic year.

A one group pretest posttest design was utilized in the present

study (Campbell and Stanley, 1963). Assessment of the health risk appraisal program was based on comparisons of pretest measures of health knowledge, behavioral intentions, and health beliefs (changeability) with corresponding posttest results. Although there are a number of limitations with the quasi-experimental design, it was considered appropriate for a pilot study and a prerequisite to future evaluations of the health risk appraisal.

All subjects completed both pretest and posttest measures of knowledge, changeability, and behavioral intentions. The pretest was administered prior to the students completion of the computerized health risk appraisal. The posttest measurements followed approximately 30 minutes after the appraisal.

The computer health risk appraisal program utilized in the pilot study included the Health Risk Appraisal program (Raines and Ellis, 1982) and Computerized Health Appraisal program (Hall, 1983). Using the Apple IIE microcomputer, a personal health risk appraisal file was maintained for each subject.

Four criteria were used to assess the educational impact of the health risk appraisal. First, the subject's knowledge of the five leading causes of death specific to the person's age, sex, and race was assessed. Second, the subjects were asked to identify a major risk factor associated with each cause of death listed. Questions used to assess knowledge of causes of death and risk factors are presented in Figure 2. Correct scores for knowledge of the causes of death and knowledge of relevant risk factors were based on the health risk appraisal and epidemiological information. Third, the subjects willingness to make changes in relevant risk factors (which refers to the concept of behavioral intentions) were evaluated using a five point

likert scale. Individual and total scores on behavioral intentions were determined. The question used to measure behavioral intent is presented in Figure 3. Fourth, the subjects' beliefs regarding perceived difficulty making health and lifestyle changes (changeability) were assessed. Again, subjects were asked to identify how difficult it would be to modify (intensity, frequency, or duration) each risk factor listed. Figure 4 presents the questions used to measure this dimension of the subject's health beliefs.

Insert Figures 2-4 about here

Results

Results of the pilot study are presented in two parts. First, pretest and posttest measures of knowledge (cause of death and risk factors), behavioral intentions, and changeability are presented. (Table 1) Second, following the discussion of each dependent measure, the results of the t-test for dependent samples are reported. (Table 2)

The mean pretest and posttest results of the subjects' knowledge of causes of death are presented in Table 1. The number of causes of death identified prior to and following the health risk assessment was 2.19 and 3.23 respectively. The number of causes of death correctly identified increased from pretest to posttest. Significant differences were found between group mean pretest and posttest knowledge scores $t(25)=3.456, p<.001$.

The mean pretest and posttest knowledge scores related to risk factors are presented in Table 1. The number of risk factors correctly identified increased from pretest (2.0), to posttest (2.6). Significant

HEALTH RISK APPRAISAL

Figure 2

Directions: Please identify in the space provided what you believe to be 5 major causes of death for a person of your age, race, and sex. Please indicate the most important risk factor (habit or behavior) which leads to each cause of death. The risk factors must refer to habits or behaviors you possess .

Cause of Death	Risk Factor
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

BEHAVIORAL INTENTIONS

Figure 3

How difficult would it be for you to change or modify each of the risk factors listed above? Please place a check mark () on the line indicating how difficult it would be to change each risk factor.

	very difficult		average difficulty		not difficult
Risk Factor #1	_____	/	_____	/	_____
Risk Factor #2	_____	/	_____	/	_____
Risk Factor #3	_____	/	_____	/	_____
Risk Factor #4	_____	/	_____	/	_____
Risk Factor #5	_____	/	_____	/	_____

CHANGEABILITY

Figure 4

How willing are you to make changes (intensity, frequency, or duration) in these risk factors? Place a check mark () on the line indicating your willingness to change each risk factor.

	very willing		somewhat willing		unwilling
Risk Factor #1:	_____	/	_____	/	_____
Risk Factor #2:	_____	/	_____	/	_____
Risk Factor #3:	_____	/	_____	/	_____
Risk Factor #4:	_____	/	_____	/	_____
Risk Factor #5:	_____	/	_____	/	_____

Table 1
Mean Pretest and Posttest Scores

	<u>Pretest</u>		<u>Posttest</u>	
	<u>$\bar{x}$</u>	<u>sd</u>	<u>$\bar{x}$</u>	<u>sd</u>
Cause of Death	2.192	.895	3.231	1.243
Risk Factors	2.077	.845	2.615	1.169
Behavioral Intent	22.458	4.559	22.958	4.486
Changeability	19.292	4.814	20.250	5.127

Table 2
Differences Between Pretest and Posttest Results

	<u>$\bar{x}$</u>	<u>sd</u>	<u>df</u>	<u>t</u>	<u>p</u>
Cause of Death					
Pretest	2.192	.895	25	3.457	.001
Posttest	3.231	1.243			
Risk Factor					
Pretest	2.077	.845	25	2.669	.0127
Posttest	2.615	1.169			
Behavioral Intent					
Pretest	22.458	4.559	23	.871	.3969
Posttest	22.958	4.486			
Changeability					
Pretest	19.292	4.814	23	1.192	.2442
Posttest	20.250	5.127			

differences were found between group pretest and posttest results, 5
 $t(25)=2.669, p < .05$.

Results of the measurement of behavioral intentions are reported in Table 1. The mean pretest and posttest behavioral intent scores were 22.458 and 22.958 respectively. No significant group differences were found between pretest and posttest measures of behavioral intentions ($t(23)=-.871, p > .05$).

Results of the measurement of changeability are presented in Table 1. The mean pretest and posttest changeability scores were 19.292 and 20.250 respectively. No significant group differences were found between pretest and posttest measures $t(23)=1.192, p > .05$.

Conclusions and Recommendations

The purpose of the pilot study was to determine the contributions of the computerized health risk appraisal when used as a supplement to the traditional methods of health instruction. Subjects enrolled in a university level personal health course were evaluated in terms of knowledge of personal causes of death, knowledge of risk factors, behavioral intentions, and changeability before and after participating in a computerized health risk appraisal. Results of the pilot study indicate significant improvements on measures of knowledge of causes of death and risk factors, and no beneficial effects on behavioral intentions and changeability. These results are consistent with research findings related to the effectiveness of computer assisted instruction. Although the diagnostic and therapeutic benefits of health risk appraisal remain uncertain, the pilot study provides further evidence of the educational value of this health promotion/disease prevention strategy.

The major limitations in the present pilot study included the

research design and measurement methods. The findings of this study should be confirmed with technically sound instrumentation and a more rigorous evaluation design. Impact of the health risk assessment should also be assessed in terms of other dependent variables including behavior and predisposing factors to behavior change. Findings of the present study indicate that the computerized health risk appraisal was a useful health promotion tool when used in a personal health class. The health risk appraisal appears to enhance health awareness of the individual's potential causes of death and relevant risk factors. Further research regarding the effectiveness and efficiency of the health risk appraisal in other settings is warranted.

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